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*On Sounds Inaudible by certain Ears.* By William Hyde Wollaston, M.D. P.R.S. Read June 29, 1820. [*Phil. Trans.* 1820, p. 306.]

In this communication the author describes a peculiar insensibility to certain sounds in the ears of persons not otherwise deaf, which he was led to observe by trying different modes of lessening the sense of hearing in himself; when he found, that by closing the nose and mouth, and expanding the chest, the membrana tympani, thrown into a state of tension by external pressure, made the ear insensible to grave tones, without affecting the perception of sharper sounds. In this case the ear was insensible to all sounds below F marked by the bass cliff.

In the natural healthy state of the ear, there seems to be no limit to the power of discerning low sounds; but if we attend to the opposite extremity of the scale of audible sounds, and with a series of pipes, exceeding each other in sharpness, examine their effects successively upon the ears of different persons, we shall find considerable difference in their powers of hearing them, and see reason to infer that human hearing is more confined than has been supposed. Dr. Wollaston's attention was called to this circumstance by finding a person insensible to the sound of a small organ pipe, which, with respect to acuteness, was far within the limits of his own hearing. By subsequent examination, this person's hearing was found to terminate at a note four octaves above the middle E of the pianoforte. Other cases of the insensibility of the ear of certain persons to high sounds are next adverted to; such as to the chirping of the grasshopper, the cricket, the sparrow, and the bat; the latter being about five octaves above the middle E of the piano. The limit of the author's own sense of hearing is at about six octaves above the middle E; and, from numerous trials, he is induced to think that, at the limit of hearing, the interval of a single note between two sounds may be sufficient to render the higher note inaudible, although the lower one is heard distinctly.

The range of human hearing includes more than nine octaves, the whole of which are distinct to most ears, though the vibrations of a note at the higher extreme are 600 or 700 times more frequent than those which constitute the gravest audible sound; and as vibrations incomparably more frequent may exist, we may imagine, says the author, that animals like the *Grylli*, whose powers appear to commence nearly where ours terminate, may hear still sharper sounds, which we do not know to exist; and that there may be insects hearing nothing in common with us, but endued with a power of exciting, and a sense that perceives the same vibrations which constitute our ordinary sounds, but so remote that the animal who perceives them may be said to possess another sense, agreeing with our own, solely in the medium by which it is excited, and possibly wholly unaffected by those slower vibrations of which we are sensible.